

WHAT IS CLAIMED IS:

1. A method for the treatment of kaolin particulate material comprising:
 - (a) providing a dispersed aqueous suspension comprising kaolin particulate material and having a pH of at least about 7.5;
 - (b) selecting at least one selective flocculation polymer, wherein said at least one selective flocculation polymer has a measured anionicity ranging from about 1% to about 12%;
 - (c) selectively flocculating said suspension into a first layer and a second layer by adding to said suspension said at least one selective flocculation polymer; and
 - (d) separating said first layer from said second layer.
2. A method according to claim 1, wherein said kaolin particulate material comprises a primary kaolin clay.
3. A method according to claim 1, wherein said kaolin particulate material comprises a sedimentary kaolin clay.
4. A method according to claim 1, wherein said kaolin particulate material comprises at least one impurity.
5. A method according to claim 4, wherein said at least one impurity is present in an amount of at least 0.1% by weight, based on the dry weight of the kaolin particulate material.
6. A method according to claim 5, wherein said at least one impurity is chosen from titania, anatase, smectite, iron oxide, and mica.
7. A method according to claim 1, wherein said dispersed aqueous suspension is provided by a process comprising including at least one dispersant with the aqueous suspension of kaolin particulate material.
8. A method according to claim 1, further comprising blunging said dispersed aqueous suspension.

9. A method according to claim 8, wherein said suspension comprises said kaolin particulate material in an amount of at least about 35% by weight, on a dry weight basis, prior to blunging.
10. A method according to claim 8, wherein said suspension comprises said kaolin particulate material in an amount ranging from about 40% to about 70% by weight, on a dry weight basis, prior to blunging.
11. A method according to claim 1, further comprising conditioning said dispersed aqueous suspension by allowing said suspension to age for a period of at least 30 minutes.
12. A method according to claim 11, further comprising conditioning said dispersed aqueous suspension by adding to said suspension at least one conditioning chemical.
13. A method according to claim 12, wherein said at least one conditioning chemical is added after said ageing.
14. A method according to claim 11, further comprising adjusting the pH of said suspension to a pH ranging from about 6.5 to about 7.5 prior to said ageing.
15. A method according to claim 1, wherein said pH is at least about 9.5.
16. A method according to claim 1, wherein said pH is in the range of from about 10.5 to about 12.5.
17. A method according to claim 1, wherein said pH is at least about 11.5.
18. A method according to claim 1, wherein said at least one selective flocculation polymer has a measured anionicity ranging from about 4.5% to about 8%.
19. A method according to claim 1, wherein said at least one selective flocculation polymer has a measured anionicity ranging from about 6% to about 7%.

20. A method according to claim 1, wherein said at least one selective flocculation polymer is chosen from water-soluble weakly anionic organic polyelectrolytes.

21. A method according to claim 1, wherein said at least one selective flocculation polymer is chosen from polyacrylamide copolymers.

22. A method according to claim 1, wherein said at least one selective flocculation polymer is chosen from polyacrylamide/polyacrylic acid copolymers.

23. A method according to claim 1, wherein said at least one selective flocculation polymer has a molecular weight of at least 100,000.

24. A method according to claim 1, wherein said at least one selective flocculation polymer has a molecular weight of at least 1,000,000.

25. A method according to claim 1, wherein said selecting at least one selective flocculation polymer comprises measuring the measured anionicity value by a titration method.

26. A method according to claim 1, wherein said suspension comprises said kaolin particulate material in an amount ranging from about 10% to about 15% by weight, on a dry weight basis, prior to said selective flocculating.

27. A method according to claim 1, wherein said at least one selective flocculation polymer is present in an amount ranging from about 0.01% to about 0.5% by weight, based on the dry weight of the kaolin particulate material.

28. A method according to claim 1, wherein said at least one selective flocculation polymer is added to said suspension in the form of a solution comprising said at least one polymer.

29. A method according to claim 28, wherein said at least one selective flocculation polymer is present in the solution at a concentration ranging from about 0.025% to about 0.25%.

30. A method according to claim 28, wherein said at least one selective flocculation polymer is present in the solution at a concentration of about 0.075%.

31. A method according to claim 1, wherein said second layer has a specific gravity ranging from about 1.001 to about 1.030

32. A method according to claim 1, wherein said second layer has a specific gravity ranging from about 1.001 to about 1.004.

33. A method according to claim 1, wherein said selective flocculating comprises mixing said suspension.

34. A method according to claim 1, further comprising redispersing said separated flocculated product layer and then selectively flocculating said redispersed layer.

35. A method for the treatment of kaolin particulate material comprising:

(a) providing a dispersed aqueous suspension of said kaolin particulate material having a pH of at least about 7.5;

(b) selecting at least one selective flocculation polymer, wherein said at least one polymer has a narrow range of variability for measured anionicity and has a measured anionicity ranging from about 1% to about 12%;

(c) selectively flocculating said suspension with adjusted pH into a first layer and a second layer by adding to said suspension said at least one polymer; and

(d) separating said first layer from said second layer.

36. A method according to claim 35, wherein said at least one selective flocculation polymer has a measured anionicity ranging from about 4.5% to about 8%.

37. A method according to claim 35, wherein said at least one selective flocculation polymer has a measured anionicity ranging from about 6% to about 7%.

38. A method for the treatment of kaolin particulate material comprising:

- (a) providing a dispersed aqueous suspension of said kaolin particulate material having a pH of at least about 7.5;
- (b) selecting at least one selective flocculation polymer, wherein said at least one selective flocculation polymer has been manufactured by a continuous process and has a measured anionicity ranging from about 1% to about 12%;
- (c) selectively flocculating said suspension with adjusted pH into a first layer and a second layer by adding to said suspension said at least one selective flocculation polymer; and
- (d) separating said first layer from said second layer.

39. A method according to claim 38, wherein said at least one selective flocculation polymer has a measured anionicity ranging from about 4.5% to about 8%.

40. A method according to claim 38, wherein said at least one selective flocculation polymer has a measured anionicity ranging from about 6% to about 7%.